

Serial No.: 09/869,990
Amendment dated: July 5, 2006
Reply to Office Action of: April 6, 2006
Atty. Docket No.: JHT-0004 (P1997J057F)

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REMARKS

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The Examiner will note that claims 1, 2 and 3 have been amended by incorporating claim 7, and claim 7 has been cancelled. The dependency of claims 8, 10, 33 and 34 have been amended accordingly.

THE EXAMINER'S REJECTION

The Examiner rejected claims 1-14, 17, 20, 22, 24, 26, 28, 30, 33 and 34 were rejected as unpatentable over McCandlish (U.S. 4,705,619) in view of Ziemer (U.S. 5,554,035).

THE EXAMINER'S GROUNDS FOR CLAIMS 1, 7-12, 33 AND 34

With respect to claims 1, 7-12, 33 and 34, McCandlish discloses contacting a hydrocarbon feedstock of tar sands under hydrocracking conditions with a bulk metal catalyst comprising $\text{Ni}(\text{Mo}_y\text{W}_{1-y}\text{O}_4)$, where y could be 0.5, which would mean the ratio of Mo to W would be 1:1, the ratio of Ni to (Mo + W) would be 1:1. Also, the moles of O would match the equation in the claim, $z = [2b + 6(c + d)]/2$ because in this case c and d each are 0.5 and b is 1, therefore, $z = 4$, which is the value disclosed in McCandlish (see McCandlish, column 1, lines 27-31 and column 3, lines 20-23, 34-36, and 45-68).

McCandlish does not disclose fractionating the hydrocracked feedstock to produce a distillate lubricating oil fraction.

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However, Ziemer discloses sending a lubricating oil base stock produced from hydrocracking to a fractionation zone to obtain a lubricating oil distillate (see Ziemer, column 7, lines 57-58).

Ziemer fractionates the lubricating oil base stock to obtain two or more fractions with varying boiling points and viscosity index values (see Ziemer, column 7, lines 57-68).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McCandlish to include sending a lubricating oil base stock produced from hydrocracking to a fractionation zone in order to obtain lubricating oil distillates of varying boiling points and viscosity index values.

APPLICANTS' RESPONSE

The Examiner states that McCandlish discloses a bulk metal catalyst comprising $\text{Ni}(\text{Mo}_y\text{W}_{1-y}\text{O}_4)$. It is urged that McCandlish does not disclose a bulk metal catalyst of the formula cited by the Examiner. Rather, the catalyst of McCandlish is obtained by heating a water soluble catalyst precursor of the formula $\text{ML}(\text{Mo}_y\text{W}_{1-y}\text{O}_4)$ in a non-oxidizing atmosphere in the presence of sulfur at a temperature of at least 200°C for a time sufficient to form the catalyst, wherein M comprises one or more divalent promoter metals selected from the group consisting essentially of Mn, Fe, Co, Ni, Cu, Zn and mixtures thereof, y is any value ranging from 0 to 1, and L is one or more, neutral, nitrogen-containing ligands at least one of which is a chelating polydentate ligand (col. 2, line 64 - col. 3, line 9).

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First, the McCandlish catalyst precursor converted to the catalyst contains a polydentate ligand. Applicants' catalyst contains no such ligands and is made from a precursor which contains no ligands (see page 4 of the specification). Both the precursor and the catalyst of applicant's invention have a unique X-ray diffraction patterns showing crystalline peaks at $d = 2.53$ Angstroms and $d = 1.70$ Angstroms. Clearly then, the catalyst of McCandlish is totally different from that of applicant.

Second, the catalyst precursors of McCandlish is water soluble which enables them to be, e.g., impregnated on suitable supports (col. 5, lines 30-36). In contrast, applicants' is made in an aqueous slurry environment in which it is insoluble. Applicants' catalyst cannot be impregnated since it is totally insoluble in water.

Third, when $y = 1$ or greater in the formula of McCandlish, W ceases to exist in the catalyst precursor. In the examples of McCandlish, the catalyst precursor is a nickel/molybdenum containing ethylenediamine as ligand, and there is no tungsten. In applicants' invention, part of the molybdenum has been replaced by tungsten.

Thus, even if McCandlish is combined with Ziemer, applicants' invention would not be taught or suggested. The McCandlish catalyst is completely different from that taught by applicants' in the cited claims.

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THE EXAMINER'S GROUNDS FOR CLAIMS 2 AND 3

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With respect to claims 2 and 3, McCandlish discloses contacting a hydrocarbon feedstock of tar sands under hydrocracking conditions with a bulk metal catalyst comprising $\text{Ni}(\text{Mo}_y\text{W}_{1-y}\text{O}_4)$, where y could be 0.5, which would mean the ratio of Mo to W would be 1:1, the ratio of Ni to (Mo + W) would be 1:1. Also, the moles of O would match the equation in the claim, $z = [2b + 6(c + d)]/2$ because in this case c and d each are 0.5 and b is 1, therefore, $z = 4$, which is the value disclosed in McCandlish (see McCandlish, column 1, lines 27-31 and column 3, lines 20-23, 34-36, and 45-68).

McCandlish does not disclose sending the hydrocracked feed to a second hydrocracking zone.

However, Ziemer discloses hydrocracking can take place in multiple steps (see Ziemer, column 3, lines 29-31).

According to MPEP §2144.04 VIB, the court in *In re Harza*, 274 F.2d 669 (CCPA 1960), held that a mere duplication of parts has no patentable significance in the absence of new or unexpected results.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McCandlish to include where hydrocracking can take place in multiple steps because a mere duplication of hydrocracking stages would have no patentable significance.

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McCandlish does not disclose fractionating the hydrocracked feedstock to produce a distillate lubricating oil fraction.

However, Ziemer discloses sending a lubricating oil base stock produced from hydrocracking to a fractionation zone to obtain a lubricating oil distillate (see Ziemer, column 7, lines 57-58).

Ziemer fractionates the lubricating oil base stock to obtain two or more fractions with varying boiling points and viscosity index values (see Ziemer, column 7, lines 57-68).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McCandlish to include sending a lubricating oil base stock produced from hydrocracking to a fractionation zone in order to obtain lubricating oil distillates of varying boiling points and viscosity index values.

APPLICANTS' RESPONSE

As noted above, McCandlish does not disclose applicants' catalyst. The reasons are set forth above and are summarized as follows.

First, the McCandlish catalyst precursor converted to the catalyst contains a polydentate ligand. Applicants' catalyst contains no ligands and is made from a precursor which contains no ligands (see page 4 of the specification). Both the precursor and the catalyst of applicant's invention have a unique X-ray diffraction

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patterns showing crystalline peaks at $d = 2.53$ Angstroms and $d = 1.70$ Angstroms. Clearly then, the catalyst of McCandlish is totally different from that of applicant.

Second, the catalyst precursors of McCandlish is water soluble which enables them to be, e.g., impregnated on suitable supports (col. 5, lines 30-36). In contrast, applicants' is made in an aqueous slurry environment in which it is insoluble. Applicants' catalyst cannot be impregnated since it is totally insoluble in water.

Third, when $y = 1$ or greater in the formula of McCandlish, W ceases to exist in the catalyst precursor. In the examples of McCandlish, the catalyst precursor is a nickel/molybdenum containing ethylenediamine as ligand, and there is no tungsten. In applicants' invention, part of the molybdenum has been replaced by tungsten.

Furthermore, the multiple steps cited by the Examiner (Ziemer, column 3, lines 29-31) have reference to hydrocracking combined with other steps, not multiple hydrocracking steps. The multiple steps of Ziemer referred by the Examiner in the cited passage include an initial denitrification or desulfurization steps. Denitrification and desulfurization and classic hydrotreating steps to reduce the concentration of nitrogen and sulfur containing contaminants to prolong catalyst life. Ziemer so states in col. 3, lines 38-45.

Thus even if McCandlish is combined with Ziemer, applicants' invention would not be taught or suggested. The McCandlish catalyst is completely different from that taught by applicants' in the cited claims. Moreover, multiple

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hydrocracking steps are not suggested by the combination of McCandlish and Ziemer.

THE EXAMINER'S GROUNDS FOR REJECTING CLAIMS 4-6

With respect to claims 4-6, the Examiner stated that McCandlish does not disclose where the second hydrocracking catalyst is a zeolite or an amorphous silica-alumina metal oxide.

However, Ziemer discloses a hydrocracking catalyst containing a crystalline aluminosilicate and an amorphous silica-alumina matrix material (see Ziemer, column 4, lines 68-column 5, line 5 and column 12, lines 28-29).

Ziemer discloses that such a catalyst enhances the performance of hydrocracking to produce a lubricating oil base stock (see Ziemer, column 4, lines 27-29).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McCandlish to include a hydrocracking catalyst containing a crystalline zeolitic aluminosilicate and an amorphous silica-alumina matrix material in order to enhance the performance for hydrocracking to produce a lubricating oil base stock.

APPLICANTS' RESPONSE

A main aspect of the invention set forth in claim 2 is that the first hydrocracking catalyst contains a bulk metal catalyst which is novel and

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nonobvious for the reasons noted above. Thus assuming arguendo that the second hydrocracking catalyst described in claim 4-6 is not novel, the process of claim 2 is still patentable over the cited art. Therefore, since claims 4-6 are dependent on claim 2, they are not taught or suggested by McCandlish in view of Ziemer.

THE EXAMINER'S REJECTION OF CLAIMS 13 AND 14

With respect to claims 13 and 14, the Examiner cited McCandlish as disclosing hydrocracking conditions comprising a temperature of 325°C, a LHSV of 2, 3 and 4, and a hydrogen rate of 3000 scf/B (see McCandlish, column 7, lines 25-30), but McCandlish does not disclose pressures from 1000 to 3500 psig.

However, Ziemer discloses hydrocracking conditions including pressure in the range 500 to 3500 psig (see Ziemer, column 4, lines 7-9).

Ziemer discloses that the balancing of reactor conditions to achieve the desired objectives is part of the ordinary skill of the art (see Ziemer, column 4, lines 20-22).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McCandlish to include hydrocracking conditions including pressure in the range of 500 to 3500 psig because the balancing of reactor conditions to achieve the desired objectives is part of the ordinary skill of the art.

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APPLICANTS' RESPONSE

Claims 13 and 14 depend respectively on claims 1 and 2. Claims 1 and 2 are not taught or suggested by the combination of McCandlish and Ziemer as set forth above. In particular, McCandlish does not teach or suggest applicants' catalyst as set forth in amended claims 1 and 2. Therefore claims 13 and 14 are patentable as the claims on which they depend are patentable.

THE EXAMINER'S REJECTION OF CLAIMS 17, 22 AND 24

With respect to claims 17, 22 and 24, the Examiner notes that McCandlish does not disclose where the distillate lubricating oil fraction is catalytically dewaxed by a 10 ring molecular sieve that is a zeolite.

However, Ziemer discloses catalytic dewaxing of a lubricating oil base stock with a ZSM-5 zeolite, which is a 10 ring molecular sieve (see Ziemer, column 8, lines 24-39).

Ziemer discloses that dewaxing with a ZSM-5 zeolite is known in the art (see Ziemer, column 8, lines 24-28).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McCandlish to include catalytic dewaxing of a lubricating oil base stock with a ZSM-5 zeolite because dewaxing with a ZSM-5 zeolite is known in the art.

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APPLICANTS' RESPONSE

Claims 17, 22 and 24 depend on claims 1 or 2. Claims 1 and 2 are not taught or suggested by the combination of McCandlish and Ziener as set forth above. McCandlish does not teach applicants' catalyst as set forth in amended claims 1 and 2. Therefore claims 17, 22 and 24 are patentable as the claims on which they depend are patentable without regards to the patentability of the dewaxing catalyst.

THE EXAMINER'S REJECTION OF CLAIMS 20, 26 and 28

With respect to claims 20, 26 and 28, the Examiner stated that McCandlish does not disclose where the catalytically dewaxed product is hydrofinished under conditions of a temperature of from 200 to 370°C, a pressure of from 150 to 3000 psig, a LHSV of from 0.2 to 5.0 and a hydrogen treat gas rate of from 100 to 5000 scf/B with a catalyst containing at least one Group VIII metal.

However, Ziener discloses hydrofinishing a catalytically dewaxed product under typical conditions including temperatures between about 190 and 340°C, at pressures from about 400 to about 3000 psig at LHSV between 0.1 and 20 and a hydrogen recycle of 400 to 1500 scf/B and suitable catalysts include Group VIII metals (see Ziener, column 8, lines 46-65).

Ziener discloses that hydrofinishing is used to produce more stable lubricating oils (see Ziener, column 8, lines 46-49).

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Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McCandlish to include hydrofinishing a catalytically dewaxed product under typical conditions including temperatures between about 190 and 340°C, at pressures from about 400 to 3000 psig at LHSV between 0.1 and 20 and a hydrogen recycle of 400 to 1500 scf/B and suitable catalysts include Group VIII metals in order to produce more stable lubricating oils under typical process conditions with a suitable catalyst for hydrofinishing.

APPLICANTS' RESPONSE

Claim 20 depends on claim 17 which in turn depends on claims 1 or 2. Claim 26 depends on claim 20 and claim 28 depends on claim 26. Claims 1 and 2 are not taught or suggested by the combination of McCandlish and Ziemer as set forth above. McCandlish does not teach applicants' catalyst as set forth in amended claims 1 and 2. Therefore claims 20, 26 and 28 are patentable as the claims on which they depend are patentable without regards to the patentability of hydrofinishing the catalytically dewaxed product.

THE EXAMINER'S REJECTION OF CLAIMS 15, 16, 18, 19, 21, 23, 25, 27 AND 29

Claims 15, 16, 18, 19, 21, 23, 25, 27 and 29 were rejected under 35 USC 103(a) as unpatentable over McCandlish in view of Ziemer as applied to claims 1, 2 and 3 above, and further in view of Bennett (U.S. 3,902,988)

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THE EXAMINER'S REJECTION OF CLAIMS 15 AND 18

With respect to claims 15 and 18, the Examiner stated that McCandlish in view of Ziemer disclose everything in claims 1 and 2 (see paragraphs and 6 of the Office Action), but do not disclose where the distillate lubricating oil fraction is solvent extracted to produce a raffinate rich in paraffinic hydrocarbons and an extract rich in aromatic hydrocarbons.

However, Bennett discloses subjecting a lubricating oil fraction to solvent extraction with furfural as solvent to remove aromatics from feeds containing paraffin wax (see Bennett, column 1 lines 41-45, column 2, lines 1-8 and column 8, lines 41-43).

Bennett discloses that aromatic removal gives an improved viscosity index (see Bennett, column 1, lines 6-9).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McCandlish in view of Ziemer to include subjecting a lubricating oil fraction to solvent extraction with furfural as solvent to remove aromatics from feeds containing paraffin wax in order to give the lubricating oil fraction an improved VI.

APPLICANTS' RESPONSE

The Examiner is not correct in concluding that McCandlish in view of Ziemer disclose everything in claims 1 and 2 except for solvent extraction. As noted previously in Applicants' Response to the rejection of claims 1, 7-12, 33 and

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34, McCandlish does not disclose a bulk metal catalyst of the formula cited by the Examiner. Rather, the catalyst of McCandlish is obtained by heating a water soluble catalyst precursor of the formula $ML(Mo_yW_{1-y}O_4)$. The McCandlish catalyst is completely different from that taught by applicants' catalyst for the reasons noted in Applicants' Response. Claims 15 and 18 depend on claims 1 and 2 and are therefore patentable since claims 1 and 2 are patentable over the cited art. The addition of the Bennett reference for teaching solvent extraction to remove aromatics does not change the argument for patentability of claims 1 and 2.

THE EXAMINER'S REJECTION OF CLAIMS 16, 21 AND 23

With respect to claims 16, 21, and 23, McCandlish in view of Ziemer further in view of Bennett disclose everything in claim 15 (see paragraph 13), but McCandlish does not disclose where the raffinate is catalytically dewaxed by a 10 ring molecular sieve that is a zeolite

However, Ziemer discloses catalytic dewaxing of a lubricating oil base stock with a ZSM-5 zeolite, which is a 10 ring molecular sieve (see Ziemer, column 8, lines 24-39).

Ziener discloses that dewaxing with a ZSM-5 zeolite is known in the art (see Ziener, column 8, lines 24-28).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McCandlish in view of Ziemer further in view of Bennett to include catalytic dewaxing of a lubricating oil

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base stock with a ZSM-5 zeolite because dewaxing with a ZSM-5 zeolite is known in the art.

APPLICANTS' RESPONSE

Claim 16 is dependent of claim 15 which is in turn dependent on claims 1 or 2. Claims 21 and 23 related back to claim 16 and further define the catalyst for cat dewaxing. Applicants have already addressed the issue of the patentability of claim 15 over combination of McCandlish, Ziemer and Bennett in the immediately preceding Response. Applicants have already noted that McCandlish in view of Ziemer do not disclose applicants' claimed bulk metal catalyst. Applicants have already addressed the catalytic dewaxing issue using a zeolite and the addition of Bennett does not change the conclusion of patentability over the cited references.

THE EXAMINER'S REJECTION OF CLAIMS 19, 25 AND 27

With respect to claims 19, 25 and 27, the Examiner states that McCandlish in view of Ziemer further in view of Bennett disclose everything in claim 16 (see paragraph 13), but McCandlish does not disclose where the raffinate is hydrofinished under conditions of a temperature of from 200 to 370°C, a pressure of from 150 to 3000 psig, a LHSV of from 0.2 to 5.0 and a hydrogen treat gas rate of from 100 to 5000 scf/B with a catalyst containing at least one Group VIII metal.

However, Ziemer discloses hydrofinishing under typical conditions including temperatures between about 190 and 340°C, at pressures from about 400 to about 3000 psig at LHSV between 0.1 and 20 and a hydrogen recycle of 400 to

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1500 scf/B and suitable catalysts include Group VIII metals (see Ziemer, column 8, lines 46-65).

Ziemer discloses that hydrofinishing is used to produce more stable lubricating oils (see Ziemer, column 8, lines 46-49).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McCandlish in view of Ziemer further in view of Bennett to include hydrofinishing under typical conditions including temperatures between about 190 and 340°C, at pressures from about 400 to about 3000 psig at LHSV between 0.1 and 20 and a hydrogen recycle of 400 to 1500 scf/B and suitable catalysts include Group VIII metals in order to produce more stable lubricating oils under typical process conditions with a suitable catalyst for hydrofinishing.

APPLICANTS' RESPONSE

Claim 19 is dependent on claim 16 which is dependent on claim 15 which is in turn dependent on claims 1 or 2. Claims 25 depends on claim 19 and claim 27 on claim 25. Applicants' refer to their response to the Examiner's rejection of claim 15 and incorporate that response herein.

THE EXAMINER'S REJECTION OF CLAIM 29

With respect to claim 29, the Examiner states that McCandlish discloses that the bulk metal catalyst can be used in hydrogenation, which is hydrofinishing (see McCandlish, column 3, lines 20-36).

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APPLICANTS' RESPONSE

Claim 29 is dependent on claim 27 which is dependent on claim 25 which is dependent on claim 19 which is dependent on claim 16 which is dependent on claim 15 which is dependent on claims 1 or 2. Applicants have already responded to the Examiner's rejection of claims 27, 25, 19, 16 and 15 which response is incorporated herein.

THE EXAMINER'S REJECTION OF CLAIMS 31 AND 32

The Examiner rejected claims 31 and 32 under 35 USC 103(a) as being unpatentable over McCandlish in view of Ziemer as applied to claims 1 and 2 above, and further in view of Eadie (U.S. 5,122,258). McCandlish in view of Ziemer disclose everything in claims 1 and 2 (see paragraphs 5 and 6 of the Office Action), but do not disclose where the distillate lubricating oil base stocks are Group III base stocks having at least about 90% saturates, a sulfur content less than about 0.03 wt.% and a VI of at least 120 or Group II base stocks having at least about 90% saturates, a sulfur content less than about 0.03 wt.% and a VI less than 120.

However, Eadie discloses one base stock with 95.2 wt.% saturates, no sulfur, and a VI of 109 and another base stock with 85.3 wt.% saturates, <1wppm of sulfur, and a VI of 117 (see Eadie, Tables 3 and 2A and MPEP §2144.05).

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Eadie discloses that an objective of hydrotreating is to increase VI of lube oil (see Eadie, column 1, lines 29-30).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McCandlish in view of Ziemer to include one base stock with 95.2 wt.% saturates, no sulfur, and a VI of 109 and another base stock with 85.3 wt.% saturates, <1wppm of sulfur, and a VI of 117 in order to meet the objective of hydrotreating by increasing the VI of lube oil.

APPLICANTS' RESPONSE

The Examiner is not correct in concluding that McCandlish in view of Ziemer discloses everything in claims 1 and 2 except for the Group III and Group II properties of the base stocks. As noted previously in Applicants' Response to the rejection of claims 1, 7-12, 33 and 34, McCandlish does not disclose a bulk metal catalyst of the formula cited by the Examiner. Rather, the catalyst of McCandlish is obtained by heating a water soluble catalyst precursor of the formula $ML(Mo_yW_{1-y}O_4)$. The McCandlish catalyst is completely different from that taught by applicants' catalyst for the reasons noted in Applicants' Response.

Furthermore, applicants' claims 1 or 2 do not claim hydrotreating for increasing VI. Thus even if Eadie discloses Group III or Group II basestocks as stated by the Examiner, the relevance of this to the presently claimed invention is not seen.

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CONCLUSION

For the reasons set forth above, it is urged that applicants have made a patentable advance in the art.

Based on the preceding arguments and amendments, the Examiner is requested to reconsider and withdraw all objections and rejections and pass this application to allowance. The Examiner is encouraged to contact applicants' attorney should the Examiner wish to discuss this application further.

Respectfully submitted:

Date: 6 July 2006

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